LBR300
Mifare® Configurable Sector Reader
User's Manual

REV.A

September 18, 2008

Mifare® Configurable Sector Reader

Overview:

LBR300 is a user configurable mifare® sector data reader. It can be configured to read mifare® card with MAD1/MAD2 standard in a mifare® application open system, or can be configured to read the user-defined sector data (Non-MAD) in a user defined closed system.

Output interface can be configured as an RS232 output or Wiegand output. Wiegand output is selectable from 26 bits to 128 bits.

LBR300 also can be set with a Reader ID number for multi-unit communication.

Features:

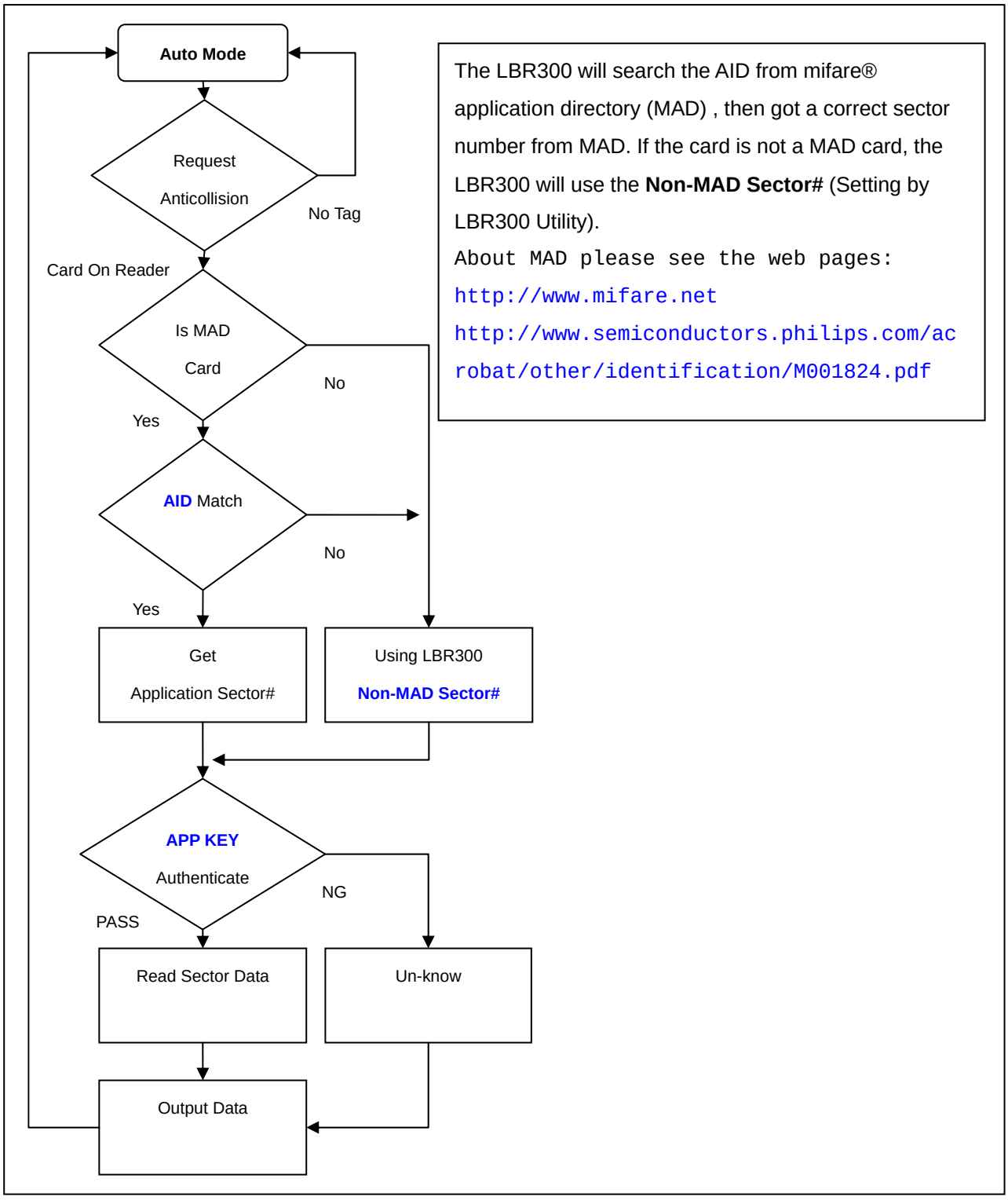
1. Possible to be installed on metal surface
2. Supports MAD1/MAD2 standard and customer MAD-AID setting
3. Supports Non-MAD format with user-defined sector number.
4. Supports Multi Sectors
5. Reads Mifare® Standard 4K or Mifare® Standard 1K card
6. Sets Reader ID number for multi-link application
7. Three output interfaces: Wiegand (Default), RS232 and MSR ABA TK2
8. Wiegand output is selectable from 26 bits to 128 bits
9. RS232 output packet can be set with Header, Reader ID and trailer
10. Internal LED and buzzer are configurable
11. Weather resistant

Application:

1. Access Control.
2. Time Attendance.
3. Guest Registration System.
4. Academic Services.
5. Info Services.

Mifare® Application Directory (MAD) Support:

LBR300 support the MAD format card, the MAD (mifare® application directory) standard proposes the introduction of common data structures for card application directory entries. LBR300 reader should take advantage of this feature using those sector pointers instead of physical sector number.



User-Data Format

LBR300 will send out the data following the format as below, the user data length defined by the Data-Info. At wiegand output format, the data output length is fixed (defined by Number Of Bits), so the user data would be cut if longer than Number of Bits, or the user data would be appended with zero “0” if shorter than Number of Bits.

		Byte 0	Byte 15
Application Sector #	Block 0	**Data-Info**	**USER DATA (Max 128 Bytes)**
	Block 1		
	Block 2		
	Block 3		

Data-Info							
bit7	bit6	bit5					bit0
Data Type (11b)		Data Length					

Data Type is fixed with 11b which meets “any other data” type of “Card Holder information” as MAD standard. And data length is including the data with ending zero “0”, so the number of data byte sent by LBR300 is equal to data length with one less for RS232 output.

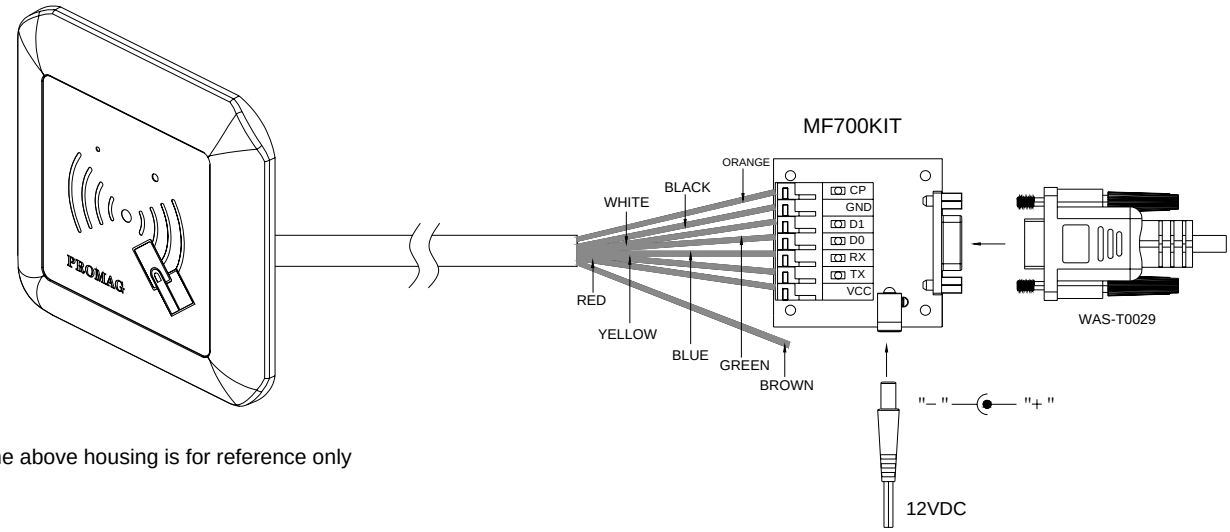
Example: Data Length is 16, LBR300 only send out 15 bytes for RS232 output.

Wires Assignment

Color	Symbol	I/O	Description
Red	VCC	IN	Power Input : DC 7.5V~24V
Black	GND	IN	Power Ground
White	DATA 1	OUT	Wiegand Data 1 Signal / ABA TK2 Clock (Strobe)
Green	DATA 0	OUT	Wiegand Data 0 Signal / ABA TK2 Data
Yellow	TXD	OUT	RS232 TXD (To Host RXD)
Blue	RXD	IN	RS232 RXD (To Host TXD)
Orange	CP	OUT	ABA TK2 Card Present
Brown	LED/BUZEER	IN	External LED/BUZZER Control

Connect To MF700KIT before configure the LBR300 Reader.

To configure the LBR300 reader you need connect the reader to the MF700KIT first as below:



The above housing is for reference only

Remark:

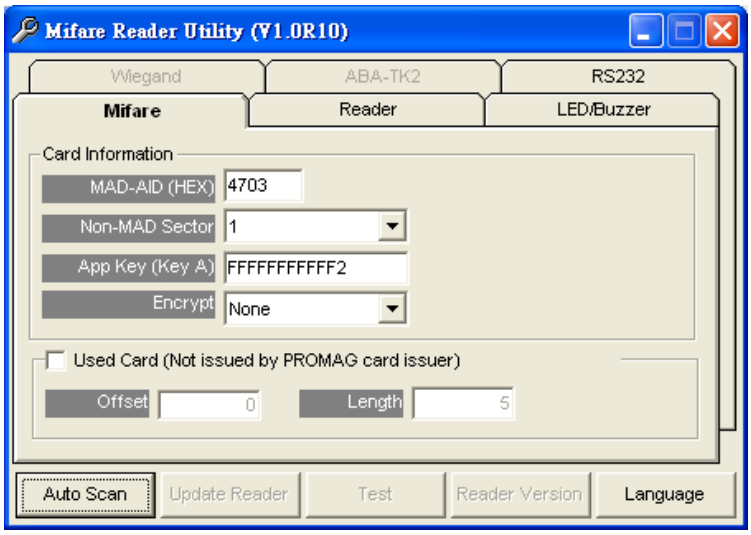
Brown wire is for External LED/Buzzer Control, and Blue wire is keep in RS232 RX signal for communication only.

Note:

MF700KIT is a test connection kit for LBR300 configuration use. It is an optional item for purchasing.

Mifare Reader Utility

1. Mifare Settings:



MAD-AID: (Default=4703)

MAD Application Identifier number is authorized and assigned by Mifare.net upon the customer's request for registered Application Identifier in a mifare® application open system (AID: 0000h~FFFFh).
Or it is also possible for the user to define the AID himself for the application in user defined closed system without registering into MAD group. According to the AID, LBR300 can find and read the corresponding sector on the MAD card.

Non-MAD Sector: (Default =0)

When the card is Non-MAD format, LBR300 will only read the "Non-MAD Sector".
(1K Card Sector: 0~15, 4K Card Sector:0~39). For the Non-MAD application, user can freely define the Sector.

App Key (KEY_A): (Default=FFFFFFFFFFFF)

App Key must be the same as the KEY_A of the card issued. This means LBR300 only can read the sector data on the card with the same KEY_A.

Encrypt: (Default=None)

Fraud prevention, Select Encrypt Mode (None, Encrypt 1, Encrypt 2, Encrypt 3, Encrypt 4, Encrypt 5) to protected your card data. (Remark: Encrypt mode must to work together with the same encrypt mode of "Mifare Card Issuer" software.)

Used Card (Not issued by "Mifare Card Issuer")

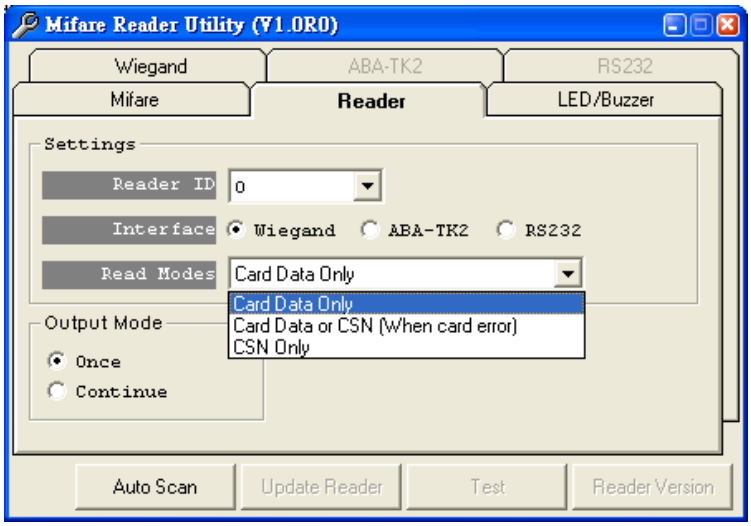
You have to indicate the data position in the card, when the card is not issued by "Mifare Card Issuer" software. And you must set the "Offset" (Max 255, and base from zero) form the beginning of sector and set your data "Length" (Max 128).

Example:

If your card data in the grey grid of sector, you have to set the "Offset" = 17, and set the "Length"= 20.

	AID Sector (or Non-MAD Sector)															
Block 0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Block 1	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Block 2	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47

2. Reader Settings



Reader ID : (Default=0)

LBR300 Reader ID for multi link application. (ID: 0~99).

Interface : (Default=Wiegand)

LBR300 can be set as Wiegand , RS232 or ABA-TK2 output.

Read Mode: (Default=Card Data Only)

a. Card Data Only: Read card sector data only; If any error (ex. mifare key error), reader will show “Card Invalid” status.

b. Card Data or CSN (Card Serial Number): Read card sector data, If any error (ex. mifare key error), reader will send the CSN to host.

c. CSN Only: CSN read only.

Output Mode: (Default=Once)

a. Once: Send data (or CSN) to host once.

b. Continue: Keeping sending data (or CSN) to host till card remove.

3. LED / Buzzer Settings

New LBR300 support the LED/Alarm Configuration. Setting the LED/Buzzer to indicate the system status for end-user.

Enable RS232 Command Set Control: (For 19200,n,8,1 Only)

RS232 LED/Buzzer command set frame as below:

STX	J	NUMBER (0~9)	CR
02h	4Ah	30h~39h	0Dh

Command Table:

NUMBER	Descriptions
0 (30h)	All LED Off, Buzzer Off
1 (31h)	Green LED ON
2 (32h)	Green LED OFF
3 (33h)	Red LED ON
4 (34h)	Red LED OFF
5 (35h)	Buzzer Beep 1 Time
6 (36h)	Buzzer Beep 3 Time
7 (37h)	Green LED ON with Beep 1 Time
8 (38h)	Red LED ON with Beep 3 Time
9 (39h)	All LED ON (Orange)

Remark: If Enable the RS232 Command Set Control (for LED/Buzzer), the external LED/Buzzer control with high/low level control will be disable.

Read Idle: Show LED color after power on or idle state.

Brown wire = PULSE (or Card is valid): Show LED color and beeps to indicate the end-user when brown wire = PULSE, or card was passed by LBR300 reader.

Brown wire = Inactive (or Card Is invalid): Show LED color and beeps to indicate the end-user when brown wire = Inactive, or card was failed by LBR300 reader.

Brown wire = Active: Show LED color and beeps to indicate the end-user that brown wire = Active signal from Host.

Brown wire Active level: Set Brown wire Active level condition with Host status.

Disable: Always disable the Brown wire. (Default), LED/Buzzer control by reader self.

High: Active High / Normal keep in Low.

Low: Active Low / Normal keep in High.

Remark:

If set Active Low, you may have to connect brown wire to a pull-up resistor (1K~10K) with 5VDC).

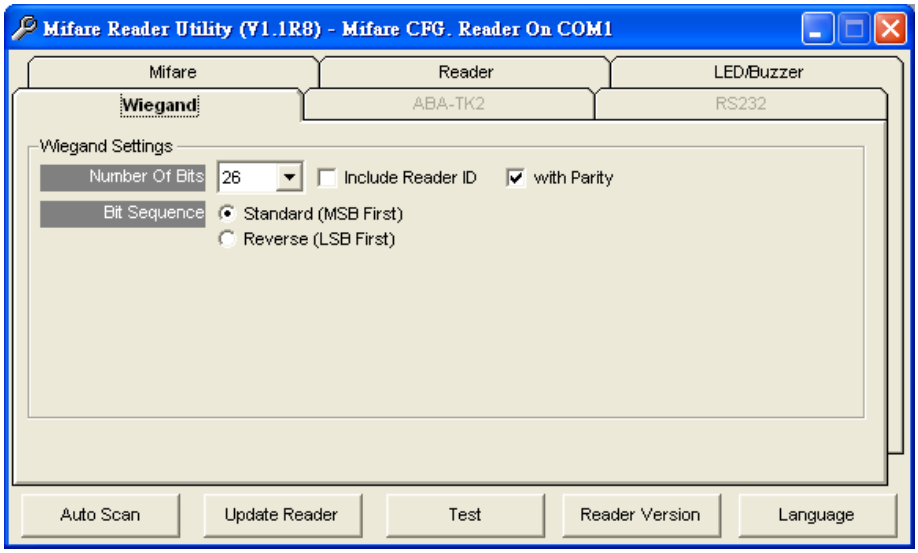
Control Brown wire:

After Data Output: The brown wire will be enabling after finished output the card data or CSN. (Default)

Any Time: The brown wire enabled in any time.

Note: See Annex E, the LED/Buzzer also can be controlled externally with High/Low level control.

4. Wiegand Setting:



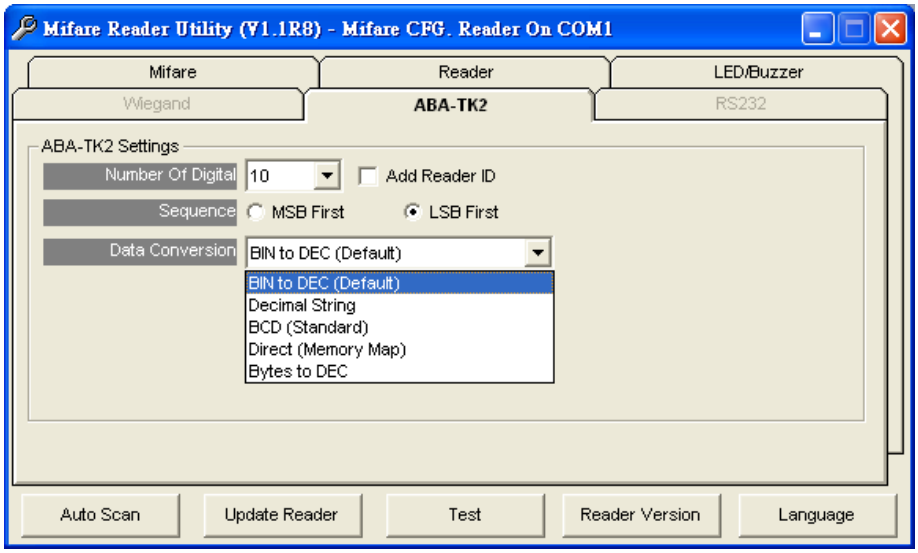
Number of Bits is to set the Wiegand output type you want to meet your Host (or Terminal). It can be 26 to 128 (Default=26).

Include Reader ID[1] is to set the Wiegand output data to include Reader ID when it is enabled. (Default=Disable).

Bit Sequence is to set the Wiegand output data sequence, it can be standard data sequence (MSB first) or Reverse data sequence (LSB first). (Default=Standard).

with Parity is to set the Wiegand output data with Parity bits or not. (Default=Enable)

5. ABA-TK2 Settings



Number Of Digital: Set number of digital codes for TK2 output. (Default=10)

Add Reader ID: Add Reader ID into TK2 data. (Default=Disable)

Sequence: Set the TK2 data sequence. (Default=MSB First)

Data Conversion: Select card data format to convert ,

a. BIN to DEC (Default, card issue by Mifare Card Issuer Utility)

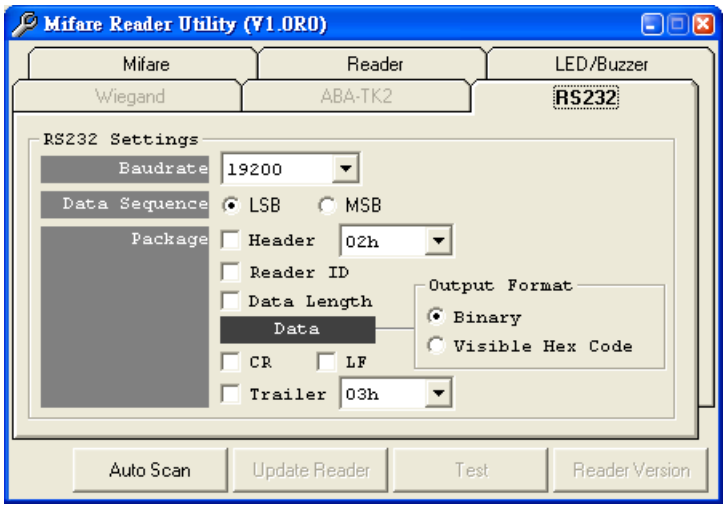
b. Decimal String (ex. “123456”)

c. BCD

d. Direct (Memory Map)

e. Bytes to DEC

6. RS232 Setting:



Baudrate can be set 2400bps~57600bps (Default=19200bps)

Data Sequence can be set "LSB" first (Default) and "MSB" first.

Package[2] is to set the output data packet to include Header, Reader ID, Data Length, CR, LF and Trailer. (Header:00h~FFh, Trailer : 00h~FFh). (Default = None included)

Output Format can be "Binary" or "Hex String" for output format.

Note:

(1).Wiegand output data packet with Reader ID:

Standard	Parity(**Even**)	Reader ID	(MSB)	Data Bits	(LSB)	Parity(**Odd**)
Reverse	Parity(**Odd**)	Reader ID	(LSB)	Data Bits	(MSB)	Parity(**Even**)

(2).RS232 output data packet with Header, Reader ID and Trailer:

Header	Reader ID	(LSB)	Data Bytes	(MSB)	Trailer

(3).ABA-TK2 with Reader ID:

MSB First	SS	Reader ID	(MSB)	Digital Code	(LSB)	ES	LRC
LSB First	SS	Reader ID	(LSB)	Digital Code	(MSB)	ES	LRC

Remark:

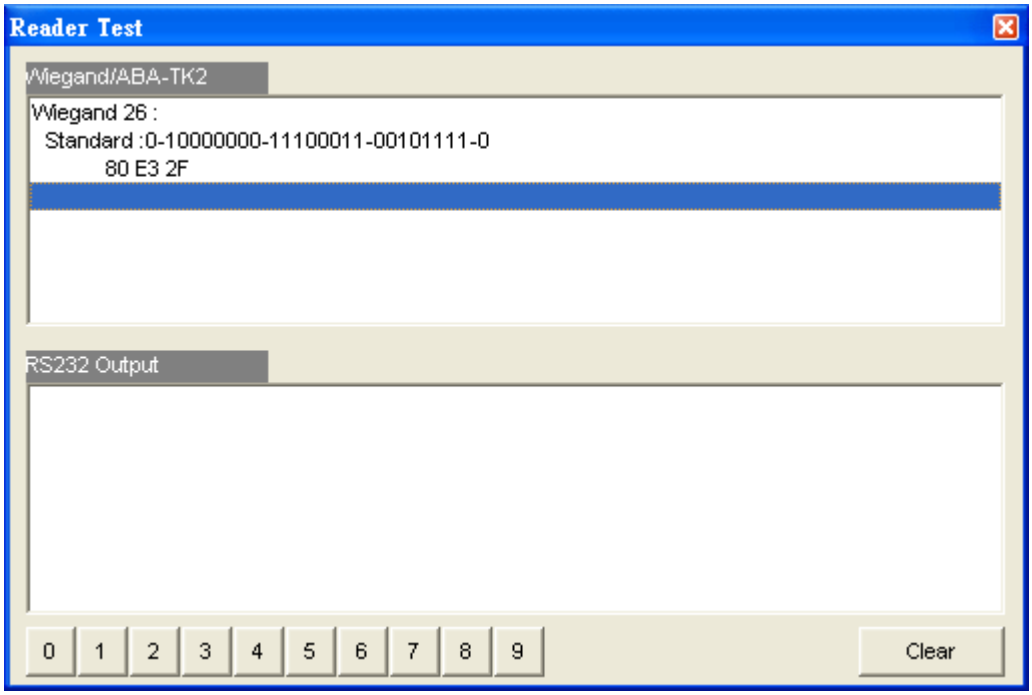
*LBR300 all configuration items are write only, so any users can not read the configuration items from LBR300 to get the **App Key**, that is very important to protect your **App Key** and all configuration items.*

Test LBR300 Reader after configuration

After LBR300 configuration is completed you may use Mifare Reader Utility “Test” function to test the LBR300 to see if the configuration is done correctly.

1. After the configuration on the Mifare Reader Utility software is made, you should click [Update Reader] to download the current configuration to the LBR300 Reader.
2. After LBR300 configuration is completed, you may click [Test] to test LBR300 Reader.
3. Get an issued mifare® card to put on LBR300 reader to be read and see the output data on the window of “Reader Test”.

Wiegand 26 bits output data with standard bit sequence, example as below:



ANNEX A. Hardware Specification

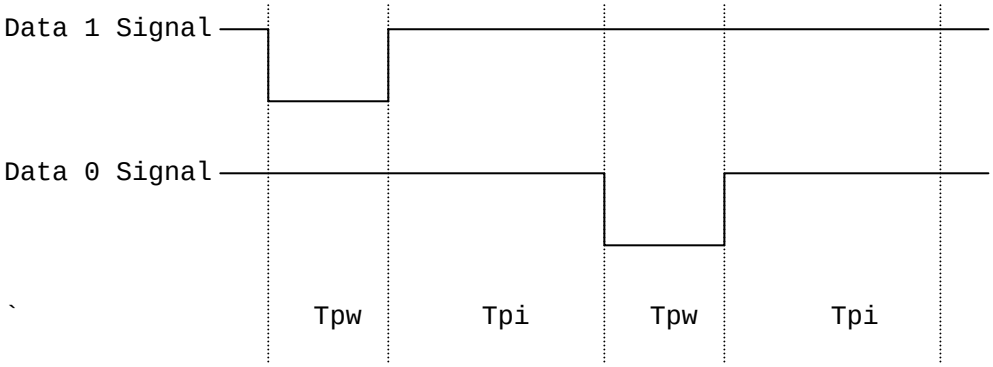
	LBR300
Major Feature	Mifare® Application Directory Reader Access Control & Security
Power Requirements	DC 7.5 ~ 24 Volts 3W
Interface	Wiegand 26 bits ~ 128bits Selectable RS232, MSR ABA -TK2
Card type	Mifare MF1 standard cards for 1024 / 4096 bytes of memory
Maximum reading distance	Up to 50 mm with MFA01 card in ideal conditions
Frequency	13.56 MHz standard
Card format	MAD1 / MAD2
Audio/Visual Indication	Buzzer /LED lamp
Dimensions	W105 x D105 x H18mm
Housing material	ABS
Environment	Operating temperature 0 ~ +60 °C Storage temperature -10 ~ +70 °C Operating relative humidity 10 ~ 90%

Note:

1. Mifare Class: Mifare Standard 1K/4K/Pro (without Mifare Ultra-Light).
2. LBR300 RF distance can reach up to 50mm with MFA01 (Mifare® Standard 1K Card) of GIGA-TMS INC.

ANNEX B. Wiegand Interface

The Data 1 and Data 0 signals are held at a logic high level unit, the reader is ready to send a data stream. The reader places data as asynchronous low-going pulses on the Data 1 or Data 0 lines to transmit the data stream to Host. The Data 1 and Data 0 pulses will allowable pulse width times and pulse interval times for the LBR300 reader.



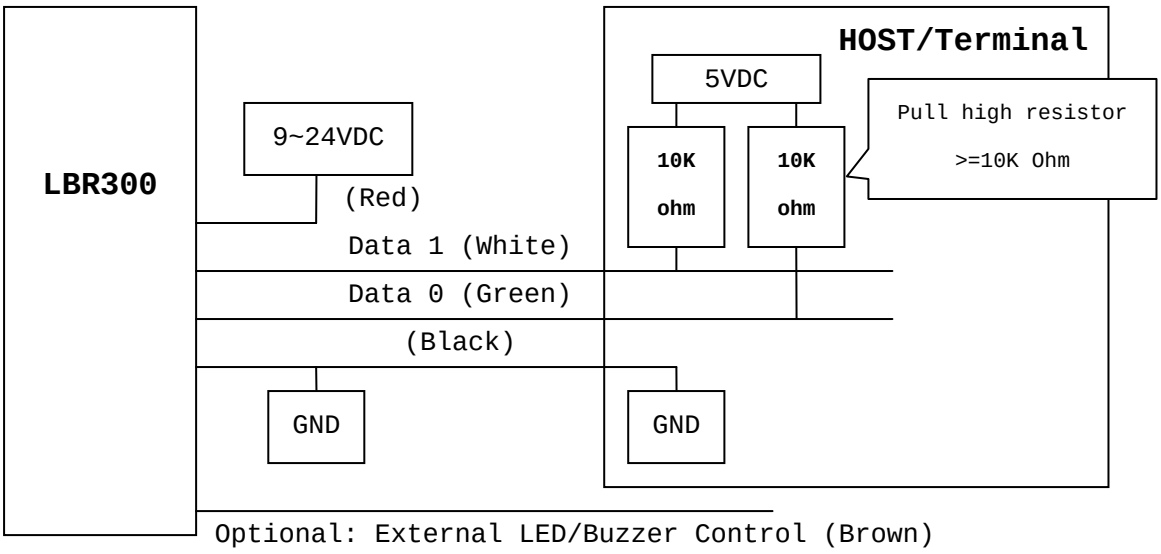
Pulse Times

Symbol	Description	Typical Time
Tpw	Pulse Width Time	100us +/- 3%
Tpi	Pulse Interval Time	1.9ms +/- 3%

Wiegand Packet (Without Reader ID)

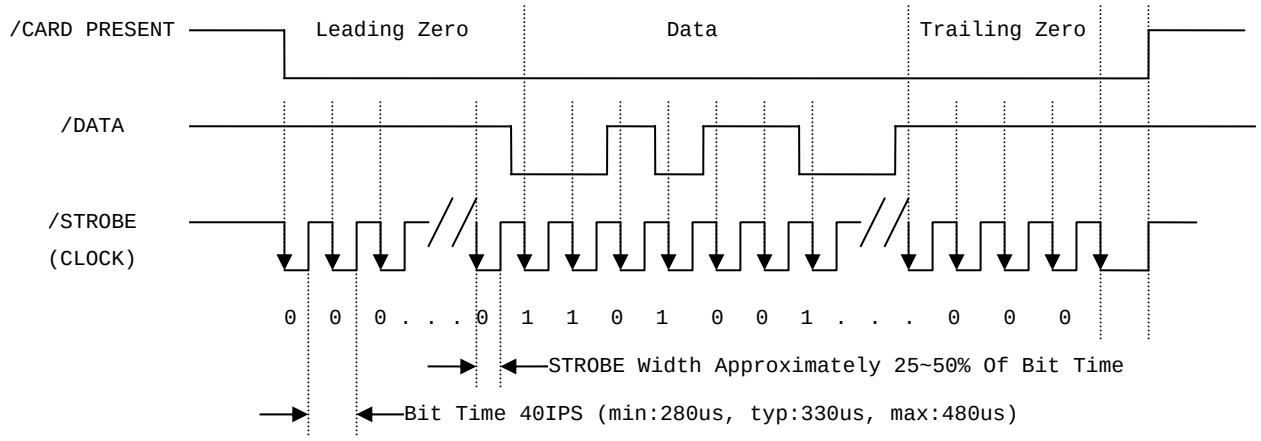
Standard (Default)	Parity(Even)	(MSB)	Data Bits	(LSB)	Parity(Odd)
Reverse (Option)	Parity(Odd)	(LSB)	Data Bits	(MSB)	Parity(Even)

Connect the Wiegand wires, example as below: (The pull high resister must >= 10K Ohm)



ANNEX C. ABA TK2 Interface

The timing for Card Present, Clock (Strobe) and Data , example as below:


/CARD PRESENT
Leading Zero
Data
Trailing Zero
/DATA
/STROBE
(CLOCK)
0 0 0 . . . 0 1 1 0 1 0 0 1 . . . 0 0 0
STROBE Width Approximately 25~50% Of Bit Time
Bit Time 40IPS (min:280us, typ:330us, max:480us)

DATA

The data signal is valid while the clock is low. If the Data signal is high, the bit is a zero. If the Data signal is low, the bit is a one.

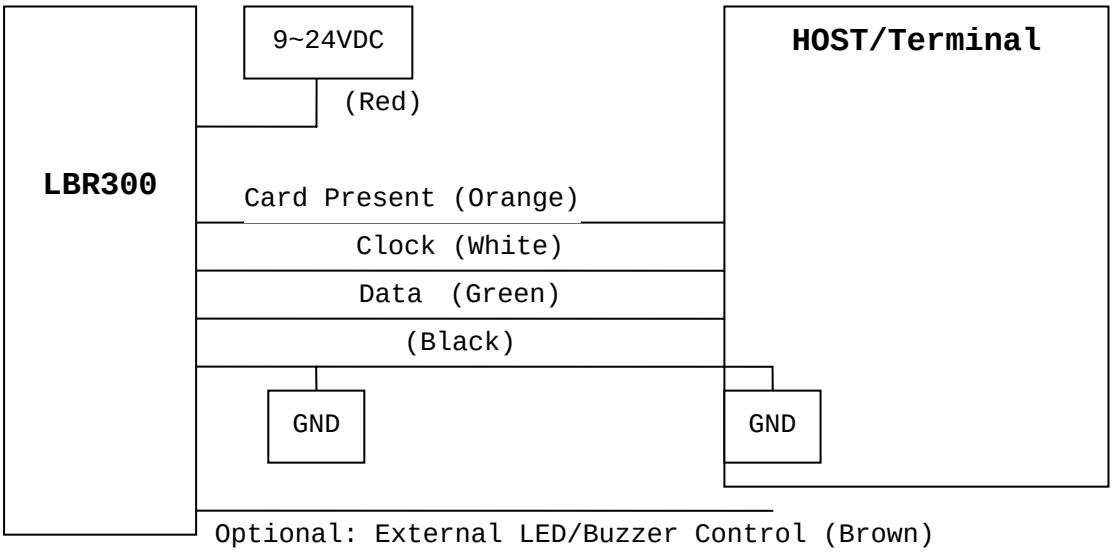
CLOCK (STROBE)

The Clock signal indicates when Data is valid. It is recommended that Data be loaded by the user with the leading edge (negative) of the Strobe.

CARD PRESENT

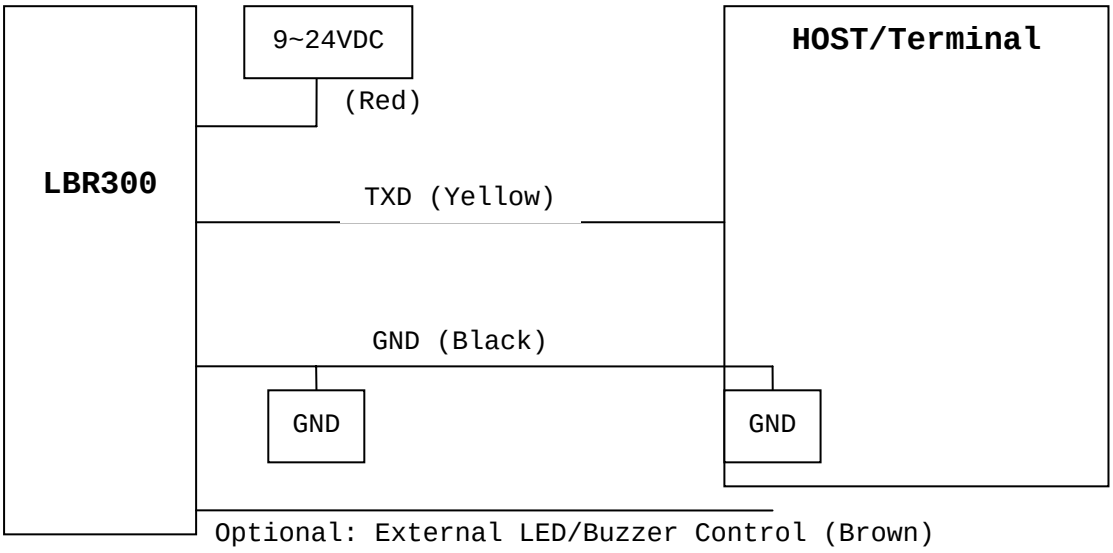
Card Present will go low after flux reversals from the Reader. Card Present will return high after the last flux reversal.

Connect the ABA TK2 wires, example as below:



ANNEX D. RS232 Interface

Connect the RS232 wires, example as below:

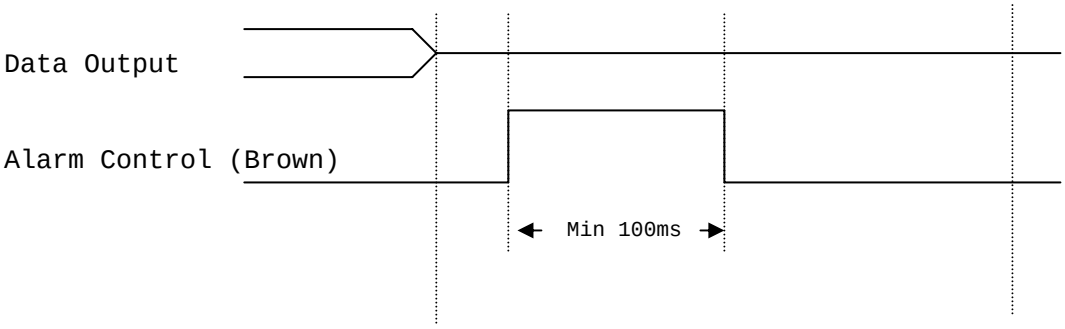


ANNEX E. External LED/Buzzer Control

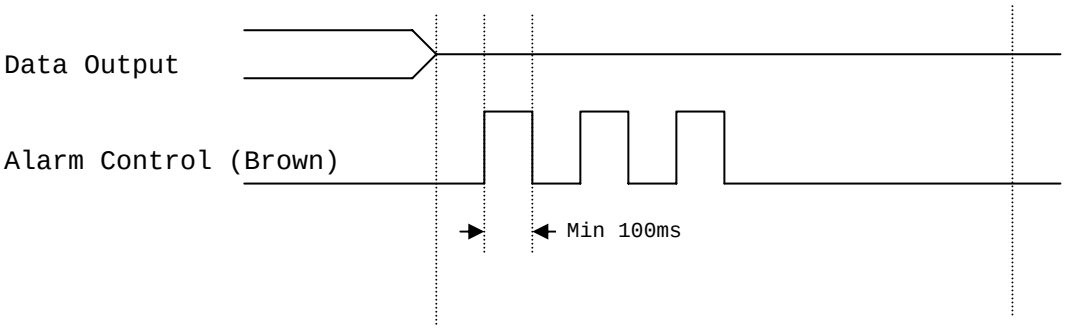
LBR300 supports the external LED/Buzzer control for Terminal (or Host) to prompt end-user the card data is invalid or valid. Use Brown wire to control the LED/Buzzer of LBR300

Examples as below: (Active High)

(1) Show External Invalid Status



(2) Show Card Valid Status



Note:

1. Send one pulse to show the “Extern Invalid” LED/Buzzer Status.
2. Send three or more pulse to show the “Card Valid” LED/Buzzer status.
3. You can configure the LED/Buzzer status by Mifare Reader utility.

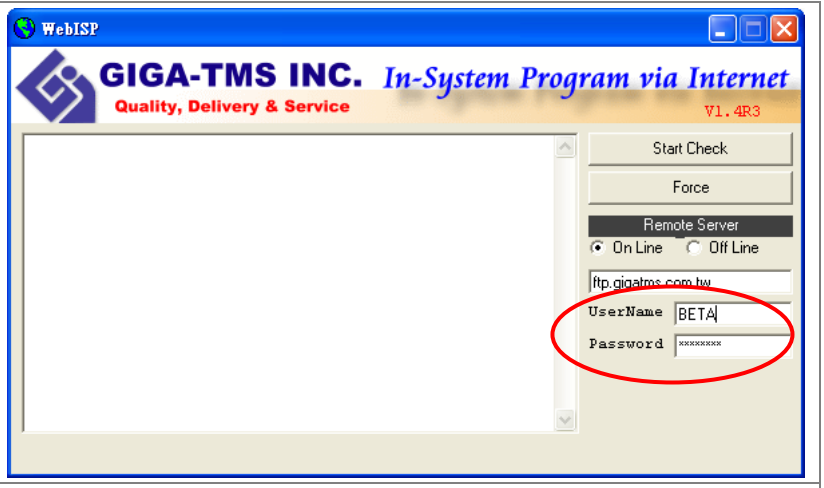
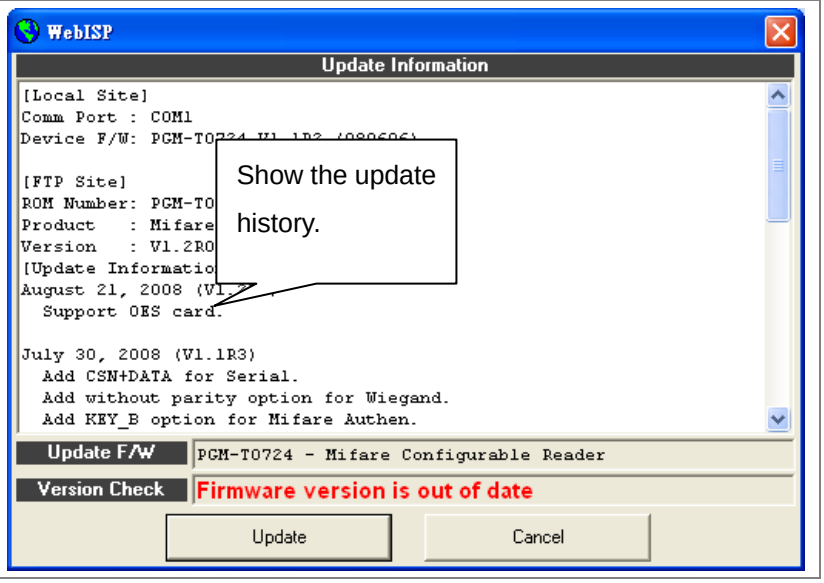
ANNEX F. Order Information

Part Number	Include	Description
LBR300-00	LBR300	LBR300 Configurable Reader
LBR300SK-00 (Start Kit)	LBR300 MF700KIT-10 MFA01(3PCS) PCR310U Power Adaptor(Option)	LBR300 Configurable Reader Reader Kit for configuration Mifare® Standard 1K Card Card Issue Programmer DC Power Adaptor 9VDC
MF700KIT-10	MF700KIT WAS-T0029 DISK5238 Power Adaptor(Option)	Reader Kit RS232 Cable(D-Sub 9P Female to Male) Card Issue and Utility Software DC Power Adaptor 9VDC
PCR310U-CI	PCR310U DISK5238 MFA01(3PCS)	Card Issue Programmer Card Issue and Utility Software Mifare Standard 1K Card
MFA01	MFA01	Mifare® Standard 1K Card
MFA04	MFA04	Mifare® Standard 4K Card

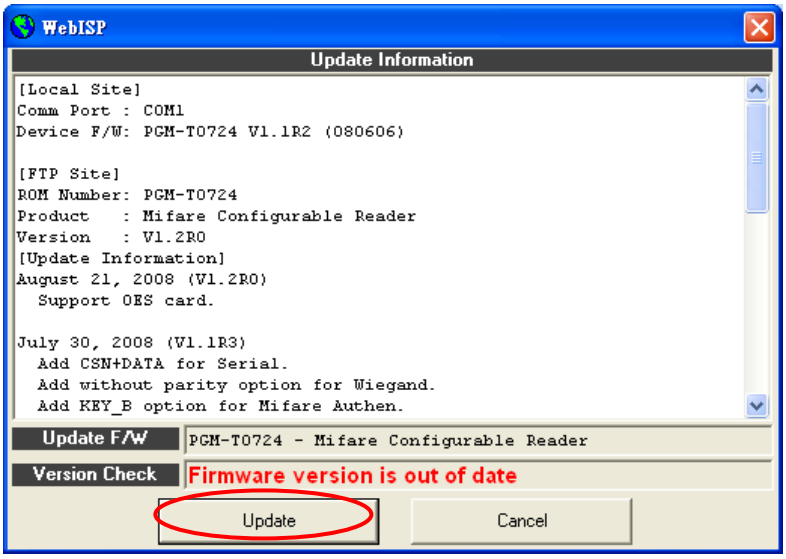
ANNEX G. WebISP - Firmware Upgrade Utility

LBR300 also supports the ISP (In-System Program) function to upgrade the reader's firmware.

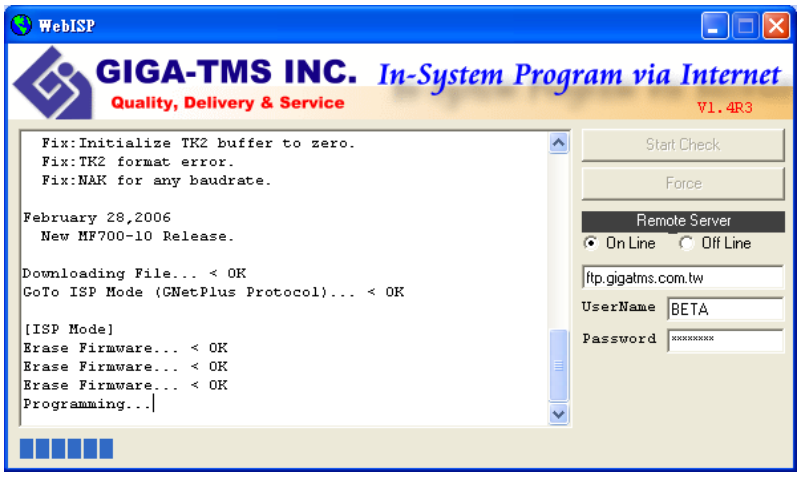
Install the WebISP (include in CD-ROM) in your Windows System first (It may need to reboot your system) and follow the steps as below: (First of all, you need to connect the reader or programmer to PC, and make sure they were power-on)

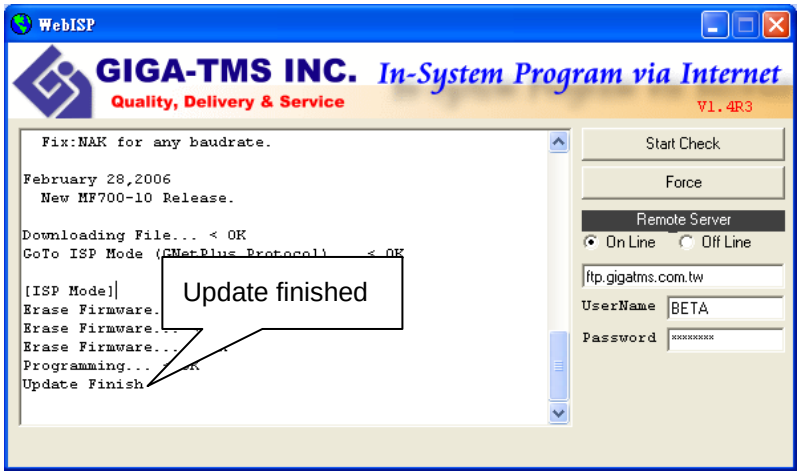
Step 1: Input your account (UserName and Password) Note: Contact us to get your account when needed.	
Step 2: Click [Start Check] to automatically check the firmware version from our FTP server. Note: 1. The WebISP will auto scan all Comm ports to search the reader or programmer. 2. The WebISP will show the [Update Information] and list the update history.	

Step 3: If your reader's or programmer's firmware out of date, then WebISP will prompt you to update the firmware. Click [Update] to begin Updating the firmware.



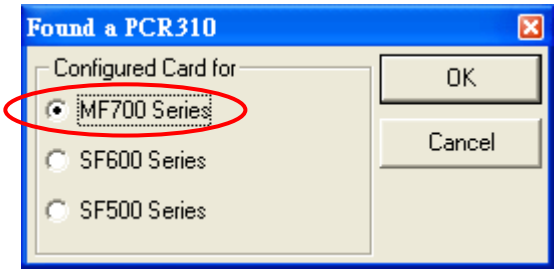
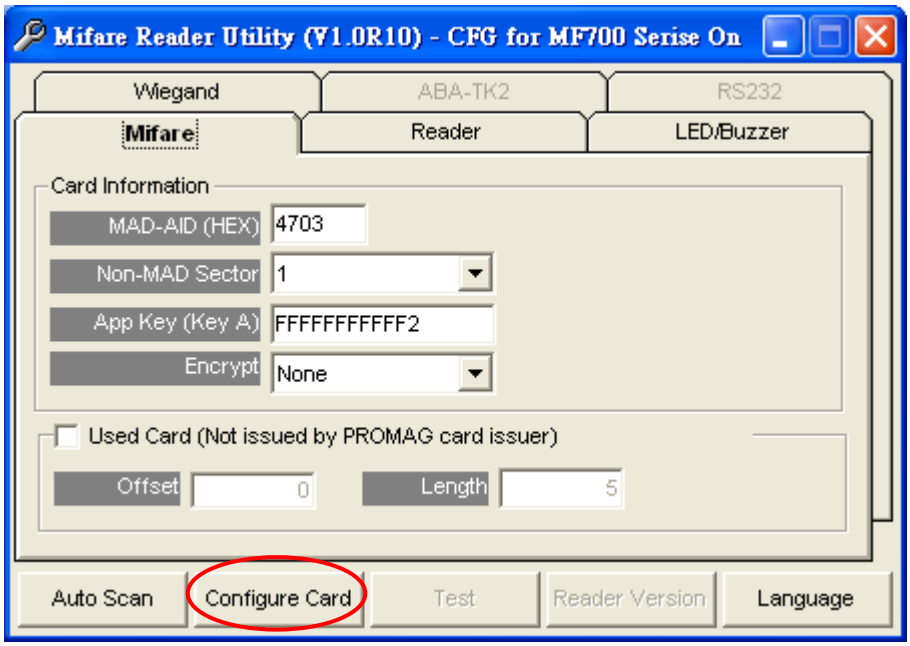
Step 4: Wait for the updating to finish. And repeat step 2 to update other readers or programmers.





ANNEX H. Configured Card

LBR300 supports updating the reader by reading Configured Card.

Step 1: Only connect PCR310 to PC without any LBR300 Reader. Click "Auto Scan", then found the PCR310. Select the "MF700 Series" option and Click "OK".	
Step 2: Click "Configure Card" to using current settings to creating a "Configured Card".	
Step 3: Put a new Mifare Card on PCR310 and Click "Create" to Create the "Configured Card"	

ANNEX G. History

Rev A: September 18, 2008
Initial LBR300 Configurable Sector Reader.

PROMAG®
GIGA-TMS INC.
http://www.gigatms.com.tw
mailto:promag@gigatms.com.tw
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FAX : +886-2-26954213
Office: 8F, No. 31,Lane 169, Kang-Ning St.,Hsi-Chih, Taipei, Taiwan